Acceleration

Acceleration

- Acceleration tells us how fast the velocity changes.
- Acceleration is the change in velocity divided by the time taken to make this change.
- A = (Vf – Vi)/(time interval) (m/s/s)
- Acceleration is a vector with both magnitude and direction.

Acceleration

- If the Velocity and the Acceleration have the same sign, the motion is speeding up. This may be speeding up forwards or speeding up backwards. The Velocity graph turns AWAY from zero, AWAY from the X-AXIS.(EX: The light turns green).

Acceleration

- If the Velocity and the Acceleration have opposite signs, the motion is slowing down. The motion can be slowing down going forward or slowing down going backward. On the Velocity graph the graph tends toward zero or toward the X-AXIS. (EX: The light turns red).

Vocabulary

- At rest means V = 0 m/s
- Stop means V = 0 m/s
- Starting from rest Vi = 0 m/s
- Start sliding Vi = 0 m/s
- Plane taking off Vi = 0 m/s
- Free Fall motion Vi = 0 m/s
- Concurrent = simultaneous = at the same time

Uniformly Accelerated Motion

- Acceleration is constant.
- The motion is in a straight line.
- Examples: free fall, airplane taking off, cars speeding up, cars slowing down, sliding down a slide, angular projectiles, horizontal projectiles

Uniformly Acceleration Motion

- $V_{avg} = (V_i + V_f)/2$
- $V_f = V_i + (A \times t)$
- $D = (V_i \times t) + (1/2 \times A \times t^2)$ (time)
- $V_f^2 = V_i^2 + 2 \times A \times D$ (no time)

Angular Projectile Motion

- 1. Vx = Vcos(angle); Vy = Vsin(angle) (m/s)
- 2. T(apex) = Vy/9.8 (s)
- 3. TOF = 2 x T(apex) = (2 x Vy)/9.8 (s)
- 4. Range = Dx = (Vx) x (TOF) (m)
- 5. apex = Dy(max) = (Vy^2)/19.6 (m)

Horizontal Projectile Motion

- 1. Use Free Fall Motion for Time of Flight (all objects fall at the same rate whether straight down or sideways). Dy = Vi t + ½ A t^2. Simply put Dy = ½ x 9.8 x t^2
- 2. Range = Dx = (Vx) x (TOF)
- 3. The angle is zero degrees (horizontal).